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More Skull Characters of the Beaked Whale *Indopacetus pacificus* and Comparative Measurements of Austral Relatives

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INTRODUCTION

Dr. Maria Luisa Azzaroli (1968) has reported on the second occurrence (in the Indian Ocean at Danane, Somali Republic) of the least known living species of the beaked whale superfamily. We consulted on some details of that work, and she generously declined my offer of collaboration. I was already concerned that evidence, particularly of shallow alveoli in the adult, presumed male, type of *Mesoplodon pacificus,* seriously embarrassed the status of *pacificus* as a species of *Mesoplodon.* Therefore, I found myself ready to be convinced by new evidence from the Danane specimen, especially in the synvertex, that *pacificus* differed generically from the 180 skull specimens of *Mesoplodon* examined by me.

Freed to proceed alone, I altered a paper then in press (Moore, 1968) on classification of the living beaked whale genera sufficiently to provide the new generic name needed for *pacificus* and to enter it adequately into the dendrogram, classification, and keys. This, nevertheless, left further original observations on the type specimen which are presented here in comparison with the second specimen, now that Dr. Azzaroli's detailed and abundantly illustrated paper is available. Some of these appear to bear on morphological maturity and some to be potential taxonomic distinctions from some other genera of beaked whales.

The three photographs used here are views not previously illustrated of the skull of the type specimen of *Indopacetus pacificus* (Longman).

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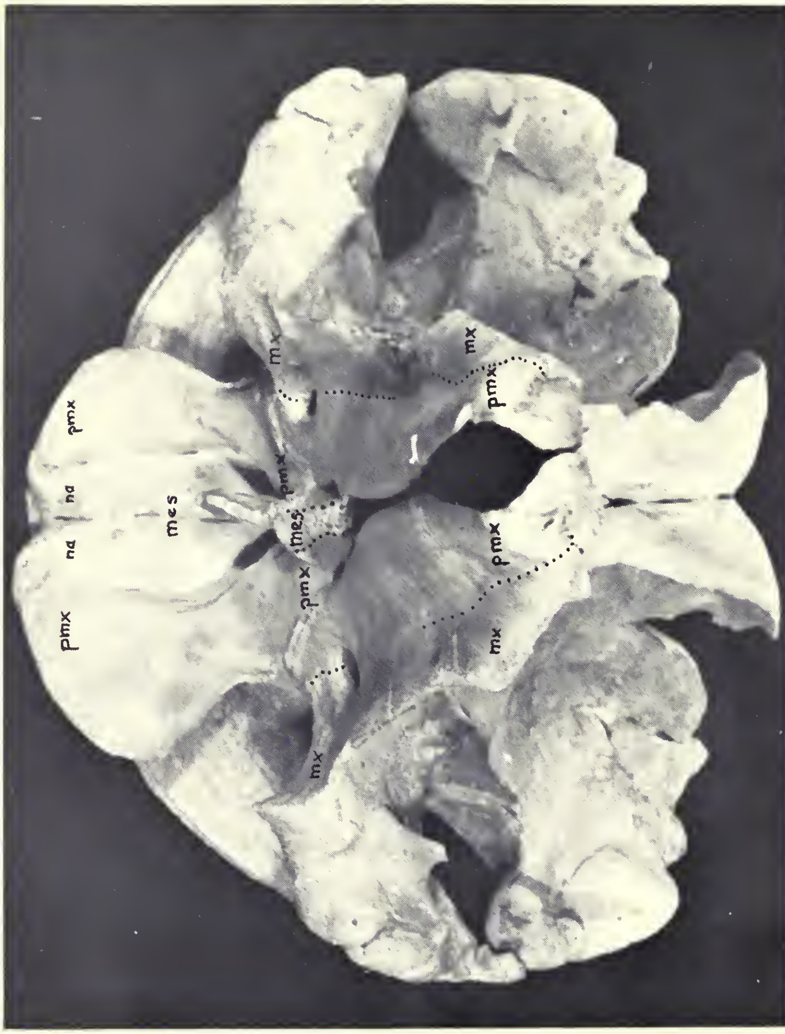
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ONTOGENETIC DIFFERENCES

At the time of examination of the type specimen of *Indopacetus pacificus* (Longman), I had progressed substantially with recording observations on the skulls of beaked whales which might yield evidence on ontogenetic changes within a species and permit estimation of morphological maturity for use when no postcranial skeleton was saved. Consequently, even though the type specimen from Mackay, Queensland, Australia, was then the only specimen known, some peculiarities which seemed to be ontogenetic caught my interest, were recorded, and may here be compared with the second specimen.

1. The premaxillary bones are solidly fused to the maxillary bones (fig. 1) in the Mackay whale for the entire length of their visible contact on the dorso-lateral surface of the beak, and on from the base of the beak to the synvertex of the skull, but are not so fused in the Danane whale (Azzaroli, 1968, figs. 4, 6).

2. The mesethmoid bone is fused to both rims of the mesorostral canal anterior to the nares for 100 mm. in the Mackay whale (fig. 1), but is not so fused at all in the Danane one (Azzaroli, 1968, fig. 4).

3. The bottoms of the nasal bones are fully fused to the mesethmoid beneath them on the posterior wall of the superior nares in the Mackay specimen (fig. 1), but prominent sutures are visible between these bones on the Danane skull (Azzaroli, 1968, fig. 10).

4. The sides of the anterior faces of the nasal bones are broadly fused to the adjacent edges of the premaxillary bones in the Mackay whale (fig. 1), but not in the Danane individual (Azzaroli, 1968, fig. 10).

5. On the palate in the Mackay individual the pterygoid bones are fused to the maxillary bones (fig. 2), but this fusion does not occur in the Danane specimen (Azzaroli, 1968, fig. 8). In the latter these bones are separated at the surface not only by very open sutures, but by the emergence of the palatine bones, between pterygoid and maxillae. (It is possible that the palatines show between pterygoids and maxillae in the Mackay whale also, but if so, fusion

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Opposite:

FIG. 1. Anterior view of skull (QM-J2106) of type of *Indopacetus pacificus* (Longman) providing glimpses of fusion enumerated in text as ontogenetic characters: 1. maxillary bones (mx) fused to premaxillary bones (pmx) along beak; 2. mesethmoid bones (mes) fused to (pmx) rims of mesorostral canal between premaxillary foramina; 3. bottoms of the nasal bones (na) fused to the mesethmoid (mes); 4. sides of the nasal bones (na) fused to premaxillary bones (pmx).

of the sutures is so complete that one could not certainly distinguish whether this were so.)

6. At the anterior emergence of the vomer on the palate (fig. 2), the vomer is solidly fused with the maxillary bones in the Mackay whale, but in the Danane whale the sutures between vomer and maxillaries are open (Azzaroli, 1968, fig. 8).

7. On the ventral surface of the cranium of the Mackay whale the thin, widely spread, posterior margin of the vomer (fig. 2) is fused with the basisphenoid bone so that the suture is obliterated except near the lateral extremities. In the same view of the Danane whale (Azzaroli, 1968, fig. 8) the suture shows as though open for three-fourths of the way across (but all the way across in another photograph of the same aspect, of which Dr. Azzaroli kindly provided me a print).

8. On the posterior surface of the cranium of the Mackay whale (fig. 3) the sutures between the supraoccipital bone and the left and right exoccipital bones are obliterated. In the Danane whale (Azzaroli, 1968, fig. 11) these typically erratic sutures may be faintly seen near the most posterior extent of the temporal fossae, the right one almost reaching the highest point of the hole broken through the occiput. (These also can be seen more clearly in the larger, lighter print that Dr. Azzaroli sent me. For examples of these sutures in other beaked whales, see True, 1910, pl. 10, figs. 2, imm. *Mesoplodon densirostris*; 3, imm. *M. europaeus*; pl. 28, fig. 4, imm. *Berardius bairdi*.)

9. In the mesorostral canal of the Mackay individual the thin edges of the vomer are fused to the premaxillary bones on the curved floor of the canal, but in the Danane specimen this is not so (Azzaroli, 1968, fig. 4).

Discussion

Five characters of the bones of the skull now variously distinguish the two known specimens of *Indopacetus pacificus* (Longman), 1926, at the generic level from *Mesoplodon* and the other four living

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Opposite:

Fig. 2. Ventral view of skull (QM-J2106) of the type of *Indopacetus pacificus* (Longman) illustrating fusions enumerated in text as ontogenetic characters: 5. pterygoid bones (pt) fused to maxillary bones (mx) on the palate; 6. vomer (vo) fused to maxillary bones (mx) farther out on the palate; 7. posterior margin of vomer (vo) fused with basisphenoid bone (basi) just posterior to the inferior nares.

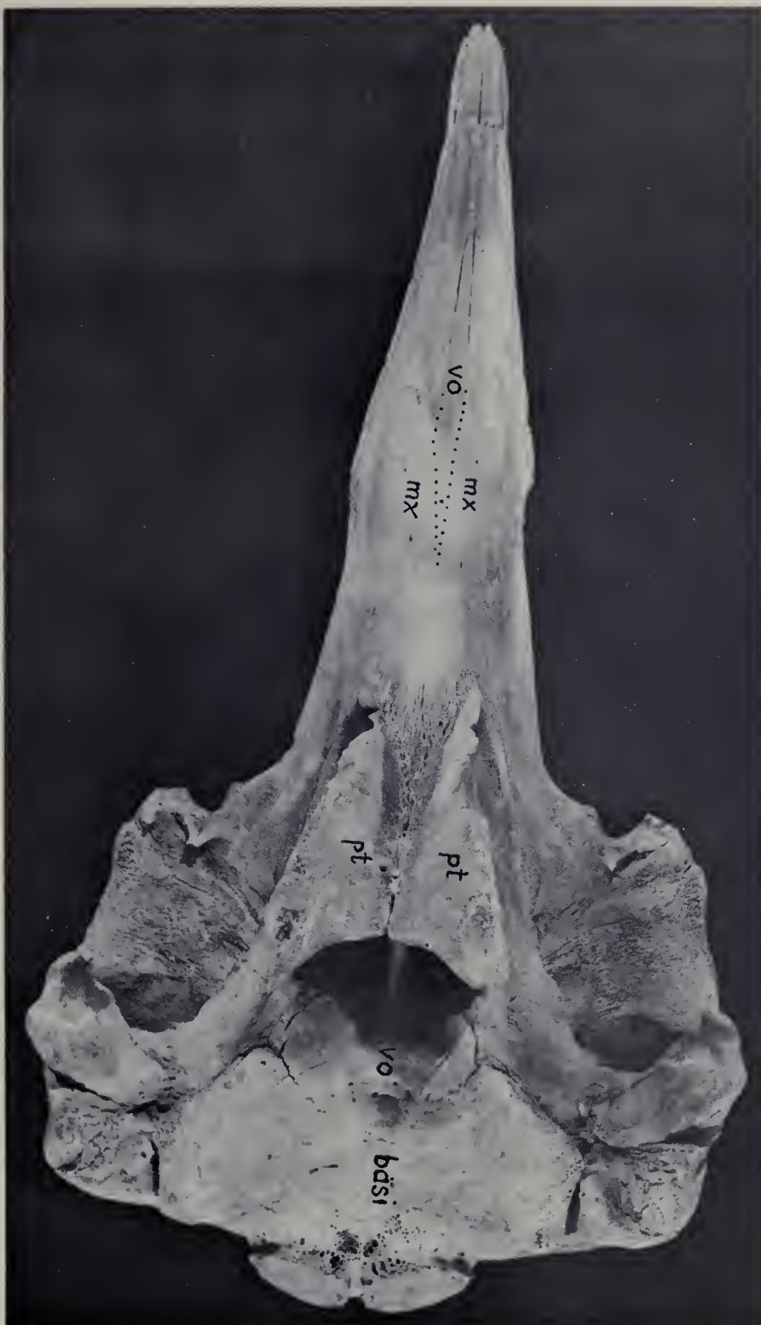

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FIG. 3. Posterior view of skull (QM-J2106) of the type of *Indopacetus pacificus* (Longman) illustrating fusion enumerated in text as ontogenetic character: 8. obliteration of the suture between the supraoccipital (sup) and exoccipital bones (ex).

genera of beaked whales (Moore, 1968, p. 282). Considerable (yet unpublished) experience with taxonomic and ontogenetic characters in some species of the genus *Mesoplodon* for which there are large samples of immatures and adults of both sexes, convinces me that the above-enumerated nine differences between the two skulls of *Indopacetus* have extremely high probability of being ontogenetic and low probability of being taxonomic ones. Evidence in Table 1 supports this in that at least two-thirds of the dimensions obtained for both skulls, the Mackay specimen exceeds the Danane one. The generally greater size and consistently advanced fusion of sutures in the Mackay whale compared to the Danane one seems unquestionably better explained as (advanced) adulthood of the Mackay whale and a considerable degree of immaturity in the Danane one.

Although there is a great scarcity of hard evidence published, David Gray (1882) reported, and Fraser (1949, p. 270), for one, ap-

pears to have accepted, that adult males of *Hyperoodon ampullatus* notably exceed the adult females in size. In other hyperoodontoid genera, contrastingly, Omura et al. (1955) find that in a large sample each of *Ziphius cavirostris* and *Berardius bairdi* the female grows larger than the male. A suggestion has been offered from study of a very much smaller sample that females may prove larger than males in *Mesoplodon europaeus* (Moore, 1960, p. 31).

In offering the above nine enumerated differences between the two skull specimens of the Indopacific beaked whale as ontogenetic differences between the two individuals, no implication is intended that all, or any particular one, of the nine shall distinguish every young from every old specimen in future acquisitions of this species. Some individual variation seems likely, but it is presumed that any quite old male will probably exhibit more than half of these nine, and that no specimen as young as the Danane one will possess any of the nine. In conclusion, it seems predictable that a future specimen of *Indopacetus pacificus* which is found to be lacking so many of these putative characters of maturity as does the Danane specimen, but for which the postcranial skeleton is available, may be found to to have some sutures of the vertebral epiphyses still open. This will establish the specimen as morphologically immature.

POTENTIAL ADDITIONAL GENERIC CHARACTERS

When the available sample of a genus is very small, estimation of taxonomic value depends more upon the observed degree to which the character state in the meagerly sampled genus differs morphologically from that in other closely related genera. Below are two characters in diminishing order of the degree of their potential distinctiveness. These characters have only been recognized as potentially taxonomic subsequent to my 1963–64 trip to study 220 specimens of beaked whales. For these two characters therefore no records can be offered from specific examination of those large samples of specimens.

(a) Fusion of a considerable length of the mesethmoid bone to both premaxillary rims of the mesorostral canal (as described for the Mackay whale in no. 2 above) is thought to be rare or unique in living species of beaked whales. If it proves characteristic of adults of *Indopacetus pacificus*, it will surely distinguish adults of *Indopacetus pacificus* from those of *Berardius, Ziphius,* and *Mesoplodon.*

(b) Proliferation of bone from the vomer (and distally the premaxillae) into the mesorostral canal at the onset of adulthood is absent or minimal in the one adult of *Indopacetus,* and since this one is probably male (Moore, 1968, p. 224), will doubtless be found so in all adults. This distinguishes *Indopacetus* from *Tasmacetus, Ziphius,* and *Mesoplodon.*

DIMENSIONS

Zoologists attempting to identify a rare whale from the skeleton, the skull, or only part of a skull, gain confidence from having a published set of dimensions of the more similar species with which to compare the specimen being identified. Although dimensions published for a substantial sample of each genus are much preferred, of course, a large suite of measurements of two adults of each represented genus may give confidence to the zoologist or amateur naturalist with access to a stranded whale but with limited local library resources.

There is recently published a key to identify specimens of six known genera of living beaked whales by skull characters, and another to identify (adults of) these same six genera by characters of the teeth (Moore, 1968, p. 288). In the same work the keys are supported by diagnoses, each composed of a number of well-described, qualitative characteristics. These provisions should enable a zoologist, and many an amateur, to identify to genus any whole skull of an adult beaked whale. Sets of measurements may help put tentative identifications on fragmentary specimens which do not show the identifying characters of the keys and diagnoses. Since a new genus was discovered in New Zealand waters only 35 years ago and one more quite new species was found in each of the two most recent decades, a large suite of measurements may help other investigators to recognize whether or not new beaked whale specimens found in this size range may represent still another new species.

Table 1 presents a large suite of measurements of the two known skulls of the Indopacific beaked whale arranged for comparison with the same dimensions of the two extant skull specimens of *Tasmacetus shepherdi* and adult specimens of each beaked whale of similar dimensions found in, or south of, the tropical Indopacific Region: *Berardius arnuxi, Ziphius cavirostris, Mesoplodon layardi, M. hectori,* and *Hyperoodon* (*Frasercetus*) *planifrons.*

Regrettably, there was insufficient time for making a set of measurements of the only known whole skull of an adult *H. planifrons* during my study visit at the South Australian Museum. Hale (1931) illustrated that specimen excellently, but his 21 measurements of its skull included only 11 of the ones that had already been evolved by other cetologists for comparisons between genera and species of toothed cetaceans and that I have effectively obtained from the gamut of living beaked whales and offer here. (See also Fraser, 1945; Tietz, 1966.) Consequently I have solicited a full set of measurements of the Port Elizabeth Museum specimen from G. J. B. Ross, who is familiar with these measurements. The Port Elizabeth Museum specimen is evidently not adult, but more nearly approximates it than any of the other immatures (Moore, 1968, p. 239).

Mesoplodon densirostris and *M. ginkgodens* are known from the tropical part of the Indian Ocean, but these species are too small to need close comparison to *Indopacetus.* For dimensions of those two species see Pringle (1963) and Nishiwaki and Kamiya (1958). *Mesoplodon layardi* is presented as the largest species of its genus, hence nearest to *Indopacetus.* It is largely for expedience to offer the first skull measurements (because they are needed, e.g., G. J. B. Ross, 1970) of the only known adult, a female (Guiler, 1967; Moore, 1968, p. 244, footnote), of *Mesoplodon hectori. Mesoplodon carlhubbsi,* the arch-beaked whale, is nearly the size of *M. layardi* and adult females when known could prove quite as large, but *M. carlhubbsi* is still known only from the temperate North Pacific, and its skull measurements are available (Moore, 1963, tables 1 and 2, Simeon to Oyhut).

Items no. 1 to 44 in Table 1 are measured and enumerated in the same way as those published earlier (Moore, 1963, p. 410, table 1), but sometimes described more clearly or succinctly. Dr. Azzaroli has found the earlier published descriptions inadequate to assure one exactly where to measure. However, by my marking a set of the photographs she provided of the Danane whale skull, Dr. Azzaroli has ascertained that the measurements which she generously provides here were taken precisely as were those given here of the type.

Tables 1 and 2 provide indications of potential taxonomic characters which investigators working with new specimens from the tropics or southern hemisphere of *Hyperoodon, Indopacetus,* or *Tasmacetus,* may be able to test.

TABLE 1.—Skull measurements (in mm.) of *Indopacetus pacificus* and six species of five other Beaked Whale genera of the southern hemisphere.

	Indopacetus		*Tasmacetus*		*Berardius*		*Ziphius*[a]		*Mesoplodon*			*Hyperoodon*	
	A	B	C	D	E	F	G	H	I	J	K	L	M
1.	1201	1130[b]	1281	1148	1225	1377[c]	908	863	1064	1013	667[d]	1210	1391
2.	815	775[b]	897	805	759	897[c]	558	517	725	677	385[d]	715	666
3.	972	775[b]	1008	907	945	1066[c]	709	666	867	803	—	855	—
4.	1015	—	—	963	992	1137[c]	754	718	900	842	—	922	1150
5.	705	705[b]	744	644	650	760[c]	468	431	597	550	313[d]	596	—
6.	797	770[b]	810	700	756	846[c]	532	497	686	622	374[d]	720	—
7.	1120	1110[b]	1214	1098	1143	1284[c]	829	759	998	941	617[d]	1080	—
8.	921	890[b]	1010	892	905	1067[c]	666	616	825	769	463[d]	890	—
9.	984	940[b]	1065	959	—	—	719	637	822	782	497[d]	895	—
10.	1155	1125[b]	1238	1122	1150	1294[c]	828	794	996	951	625[d]	1130	—
12.	749	740[b]	761	693	668	789[c]	496	464	653	588	347[d]	595	—
13.	178	155	205	202	255	238	143	150	139	140	97	210	—
14.	130	135	145	132	120	127	121	105	119	128	104	156	—
15.	55+	86	114	104	121	130	111	122	70	59	53	85	—
16.	—	65	90	83	107	123	105	115	64	53	62	±100	—
17.	529+5	490	572	—	716	740	486	476	440	428	302	636	—
18.	527	480	572	509	707	724	485	480	420	417	301	600	—
19.	504+5	470	543	—	668	705	464	452	419	406	276±3	628	—
20.	315	315	293	260	358	370	272	278	264	258	197	350	—
21.	162	160	166	153	222	215	144	145	140	135	106	204	237
22.	68	75	68	62	89	88	60	59	53	47	41	85	—
23.	98	99	111	94	153	164	98	104	92	95	74	141	174
24.	53	54	55	48	88	72	54	61	51	50	39	85	60
25.	459	425	445	416	536	535	388	383	354	342	245	473	—

Enumerated Measurements for Table 1

1. Apex of rostrum to most posterior point on occipital condyles.
2. Apex of rostrum to a transverse plane that transects apices of antorbital notches.
3. Apex of rostrum to anterior margin of inferior nares.
4. Apex of rostrum to free apex of pterygoid bone.
5. Apex of rostrum to anterior apex of pterygoid bone.
6. Apex of rostrum to apex of maxillae between pterygoid bones.
7. Apex of rostrum to most posterior extremity of either maxilla.
8. Apex of rostrum to anterior margin of superior nares.
9. Apex of rostrum to most anterior part of premaxillary crest.

10.* Apex of rostrum to most posterior part of temporal fossa.

12. Apex of rostrum to anterior margin of pterygoid sinus.
13. Greatest length of temporal fossa.
14. Greatest length of orbit.
15. Greatest length of right nasal on synvertex of skull.
16. Length of nasal suture.
17. Greatest breadth of skull across postorbital processes of frontals.
18. Greatest breadth of skull across zygomatic processes of squamosals.
19. Greatest breadth of skull across centers of orbits.
20. Least breadth of skull across posterior margins of temporal fossae.
21. Greatest lateral spread of occipital condyles.
22. Greatest width of wider occipital condyle.
23. Greatest length of longer occipital condyle.
24. Greatest width of foramen magnum.
25. Greatest lateral spread of exoccipital bones.

TABLE 1.—Skull measurements (in mm.) of *Indopacetus pacificus* and six species of five other Beaked Whale genera of the southern Hemisphere—*Continued.*

	Indopacetus		*Tasmacetus*		*Berardius*		*Ziphius*[a]		*Mesoplodon*			*Hyperoodon*	
	A	B	C	D	E	F	G	H	I	J	K	L	M
26.	106±	85	95	91	132	124	75	75	57	40	41	90	—
27.	—	63	55	53	94	99	66	—	27	29	20	88	—
28.	—	—	0	0	0	0	0	—	17	32	19	±30	—
29.	241	227	198	172	202	210	182	186	167	167	118	265	—
30.	160	163	169	155	179	185	165	190	115	122	114	181	—
31.	167	—	181	169	218	217	170	204	121	127	127	170	295
32.	90	76	63	66	92	98	55	66	37	34	31.5	103	—
33.	345	335	366	334±3	438	442	296	299	235	255	170	403	500
34.	292	302	272	231	—	—	—	245	123	129	116	±186	—
35.	126	128	127	119	163	167	97	115	54[e]	61	40	140	—
36.	58	55	95	78	80	92	64	103	65	79	45	110	—
37.	90	87	92	88	98±	95	76	90	57	53	53	±100	—
38.	130	125	144	115	150	175	118	117	109	103	75	144	—
40.	115	112	127	117	124	132	80	80	71	92	66	±120	—
41.	119	118	142	126	157	182	114	126	108	106	88	± 80	—
42.	43	37	69	67	85	99	48	—	34	39	43	67	—
43.	101	87	99	96	172	165	98	—	67	70	50	286	—
44.	350	—	345	1040	385[f]	410	191	192	262	257	147	±230	—
47.	246	212	280	—	360	370	257	235	225	220	124±1	—	—
48.	216	195	254	230	315	334	211	195	178	180	112±3	—	—
49.	221	210	282	225	278	303	222	213	212	215	149	—	—
50.	180	—	—	167	260	241	156	162	149	155	—	—	—

Enumerated Measurements for Table 1

26. Greatest lateral spread of nasal bones.
27. Greatest distance between premaxillary crests.
28. Greatest extension of right premaxilla posterior of rt. nasal.
29. Greatest spread of premaxillary crests.
30. Narrowest spread of smooth part of premaxillae beside nares.
31. Greatest spread of premaxillae anterior to 30.
32. Greatest spread of premaxillae at midlength of rostrum.
33. Greatest width of rostrum at apices of antorbital notches.
34. Greatest width of rostrum at apices of prominential notches (if any).
35. Greatest width of rostrum at midlength of rostrum.
36. Greatest depth of rostrum at midlength of rostrum.
37. Greatest transverse width of superior nares.
38.* Inside width of inferior nares at apices of pterygoid notches.
40. Greatest width of temporal fossa about perpendicular to long axis.
41. Least distance between main or anterior maxillary foramina.
42. Least distance between premaxillary foramina.
43. Posteromesial margin of left maxillary foramen to apex of left antorbital tubercle.
44.* Greatest length of vomer at surface of palate (near midlength of beak).
47. Center of right orbit to nearest margin of superior nares.
48. Center of left orbit to nearest margin of superior nares.
49. Apex of pterygoid notch to anterior edge of pterygoid sinus.
50. Greatest width of pterygoid sinus about perpendicular to long axis.

*Nos. 11, 39, 45, and 46 although used in some earlier works, are here intentionally omitted.

Footnotes to Table 1

[a]See Ross and Tietz (in press) for southern hemisphere specimens of *Ziphius cavirostris*.

[b]Calculated, see Azzaroli (1968, p. 71), and note that she says, "a small portion of the tip of the maxillary was preserved." Her Figures 5 and 7 show this fragment to be of the premaxillary.

[c]Twenty mm. (as estimate of portion missing from broken apex of beak) already added to the measurement.

[d]Thirty mm. (as estimate of portion missing from broken apex of beak) already added to the measurement. To measurement no. 1 an extra 5 mm. was also added as an estimate of length lost from occipital condyles.

[e]Three mm. already added to measurement, for estimated amount of bone broken away.

[f]Thirty mm. already added to measurement, for estimated amount of bone broken away.

Table 2.—Mandible measurements (in mm.) of *Indopacetus pacificus* (A, B) to compare with those of other genera of Beaked Whales of the southern hemisphere.

	Indopacetus		*Tazmacetus*		*Berardius*		*Ziphius*		*Mesoplodon*			*Hyperoodon*	
	A	B	C	D	E[1]	F	G	H	I	J	K	L	M
1.	1087	1010	1146	1038	1253	1219	809	680	880	870	578±2	—	1184
2.	317	290	434	427	340	321	190	148	277	280	193±2	—	392
3.	167	170	172	155	219	212	152	125	—	129	—	196	218
4.	—	—	45	42	87	85	23	—	55	50	25±1	—	—
5.	—	—	42	—	—	77	25	—	61	64	—	—	—
6.	778	745	727	639	936	923	628	538	612	595	393	717	—
7.	1052	1000	1106	1003	1151	1129	783	655	545	527	534	—	—
8.	30	—	42	34	72	70	24	15	139	120	27±1	—	—
9.	18	—	23	22	—	41	29	12	16	17	7	—	—
10.	7	—	4	10±2	38	23	0	7	204	—	11±1	—	—
17.	17	—	—	25	71	59	—	—	66	60	17	—	—
18.	45	—	—	47	90	92	35	28	64	72	28	—	—

[1] See list of specimens.

Enumerated Measurements

1. Apex of mandible to most posterior point on condyle.
2. Apex of mandible to most posterior point on symphysis.
3. Greatest height of mandible at coronoid process.
4. Greatest outside height of mandible at midlength of alveolus.
5. Greatest inside height of mandible at midlength of alveolus.
6. Most posterior point on condyle to most post. pt. on symphysis.
7. Most posterior point on condyle to most post. pt. on alveolus
8. Greatest length of aperture of alveolus.
9. Greatest width of aperture of alveolus.
10. Least distance from aperture of alveolus to apex of mandible.
17. Greatest height of mandible at anterior end of alveolus.
18. Greatest height of mandible at posterior end of alveolus.

Specimens Referenced by Capital Letters in Tables 1 and 2.

A. The type specimen of Indopacific Whale, *Indopacetus pacificus*, adult (♂), Queensland Museum no. J.2106, skull and jaw found on beach near Mackay, Queensland, in 1881.

B. Immature of Indopacific Whale, *Indopacetus pacificus*, Mus. Zool. del. Univ. Firenze no. M.4854C, skull, mandible found on shore near Danane, Somali Republic, 1956. Measurements contributed by Dr. M. L. Azzaroli.

C. Adult ♂ the Tasman Whale, *Tasmacetus shepherdi*, Univ. Canterbury Mus. Zool. no. 1063, skeleton saved from fresh animal stranded Birdlings Flat, near Christchurch, N. Z.

D. The type specimen of the Tasman Whale, *Tasmacetus shepherdi*, adult, Wanganui Public Museum no. 5645, animal beached at Ohawe, Taranaki, New Zealand, Nov. 7, 1933, skeleton.

E. Adult ♀ of Four-toothed Whale, *Berardius arnuxi*, South Australian Museum no. 5012, stranded alive 2 miles south of Port Lorne, S. Australia, Dec. 27, 1935, skeleton preserved.

E.[1] (Only in Table 2) Adult of Four-toothed Whale, *Berardius arnuxi*, Otago Museum (Dunedin, N. Z.) no. A14.37, lower jaw from bay outside Taiaroa Heads on Otago Peninsula, N. Z.

F. Adult of Four-toothed Whale, *Berardius arnuxi*, Otago Museum (Dunedin, N. Z.) no. A24.69, skull obtained from Stewart Island, N. Z., in or before 1924.

G. Adult ♀ of Goose-beaked Whale, *Ziphius cavirostris*, Field Museum of Natural History (Chicago, Ill., U.S.A.) no. 95286, a skeleton from La Parguera, Puerto Rico, stranded alive, Feb., 1961.

H. Adult ♂ of Goose-beaked Whale, *Ziphius cavirostris*, Field Museum of Natural History no. 112530, skull from Wassaw Island, Georgia (U.S.A.), Sept., 1967.

I. Adult ♂ of Strap-toothed Whale, *Mesoplodon layardi*, Western Australian Museum (Perth) no. 4564, from north of Pt. Peron near Rockingham, W. Australia, July, 1959.

J. Adult ♂ Strap-toothed Whale, *Mesoplodon layardi*, Australian Museum (Sydney) no. 8229, stranded April 3, 1962, on Curl Curl Beach, Sydney, Australia.

K. Adult ♀, Austral Beaked Whale, *Mesoplodon hectori*, Tasmanian Museum (Hobart) no. A-741, skull from carcass stranded at East Cove, Adventure Bay, Bruny Island, Tasmania, March 12, 1966.

L. Subadult ♂, Southern Bottle-nosed Whale, *Hyperoodon* (*Frasercetus*) *planifrons*, Port Elizabeth Museum no. 1503/22, skull from individual stranded at Humewood, Port Elizabeth, South Africa, Jan. 18, 1964. Measurements contributed by Graham J. B. Ross.

M. Adult ♂, S. Bottle-nosed Whale, *Hyperoodon* (*Frasercetus*) *planifrons*, South Australian Museum (Adelaide) no. M2852, skeleton from an individual stranded alive 13 miles south of Port Victoria, Yorke Peninsula, South Australia, Nov. 22, 1929.

SUMMARY

The two skulls known of *Indopacetus pacificus,* the Indopacific Beaked Whale, compared here for indications of relative maturity in nine characters, show the type specimen (from Mackay, Queensland) to represent a much older individual than does the specimen from Danane, Somali Republic. Two characters are described as potentially further taxonomic ones. To facilitate identifications of new specimens, particularly of badly damaged skulls, sets of skull measurements of these two specimens are presented with corresponding measurements of the only two extant skulls of *Tasmacetus shepherdi,* two each of *Berardius arnuxi, Ziphius cavirostris, Mesoplodon layardi, Hyperoodon planifrons,* and the only known adult of *Mesoplodon hectori.*

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Dr. Eric R. Guiler of the University of Tasmania arranged the loan and shipped me the skull of the only adult known of the Austral Beaked Whale, *Mesoplodon hectori,* whose measurements are presented here.

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